



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/540,389

07/20/2005

Satoshi Takei

124418

2689

25944

7590

06/07/2007

OLIFF & BERRIDGE, PLC

P.O. BOX 19928

ALEXANDRIA, VA 22320

EXAMINER

CHOI, LING SIU

ART UNIT

PAPER NUMBER

1713

MAIL DATE

DELIVERY MODE

06/07/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/540,389

Applicant(s)

TAKEI ET AL.

Examiner

Ling-Siu Choi

Art Unit

1713

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This Office action is in response to the Amendment filed 03/15/2007. Claim 13 was canceled and claims 1-12 are now pending. In view of the Amendment, the objections were withdrawn and the rejections of claims 1-12 by Rutter et al. (EP 1 150 343 A2), Takei et al. (EP 1 315 045 A1), and Meador et al. (US 5,919,599) are maintained.

Claim Analysis

2. Summary of Claim 1:

A gap fill material forming composition, wherein	
	the composition is used in manufacture of semiconductor device, comprising coating a photoresist on a substrate having a hole with aspect ratio shown in height/diameter of 1 or more, and transferring an image to the substrate by use of lithography process
	the composition is used in a process in which the composition is coated on the of substrate and is contacted with an alkaline aqueous solution after baking, then the photoresist is coated
	the composition comprises a polymer having a <u>hydroxy group or a carboxy group</u> and a crosslinking agent
	a gap fill material layer manufactured by coating the gap fill material forming composition on a semiconductor substrate and baking it has a dissolution rate for an alkaline aqueous solution having a concentration of 0.1% to 20% ranging from 3 to 200 nm per second

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

4. Claims 1-2 and 4-13 rejected under 35 U.S.C. 102(b) as being anticipated by Rutter et al. (EP 1 150 343 A2).

Rutter et al. disclose a composition comprising one or more crosslinkable polymers having a weight average molecular weight of less than or equal to about 8,000, wherein the crosslinkable polymer comprises at least one hydroxyl group containing monomer, wherein the crosslinker includes di-, tri-, tetra, or higher multi-functional ethylenically unsaturated monomer; the hydroxy group containing monomer is aliphatic or aromatic, which is vinyl phenol, vinyl cresol, vinyl methoxy phenol, hydroxyethyl (meth)acrylate, 2-hydroxypropyl (meth)acrylate, 3-hydroxypropyl (meth)acrylate, hydroxycyclohexyl (meth)acrylate, hydroxyphenyl (met)acrylate, di-ethyleneglycol (meth)acrylate....hydroxyethyl itaconate ([0027]; [0043]; claim 1). Rutter et al. further disclose that the composition comprises acid catalyst which includes free acid and acid generator. Rutter et al. furthermore disclose the composition provides

Art Unit: 1713

substantially planarized surface in the manufacture of electronic devices and can function as an antireflective coating for 193 nm radiation when the composition contains aromatic group (abstract; [0062]). Thus, the present claims are anticipated by the disclosure of Rutter et al.

5. Claims 1-13 are rejected under 35 U.S.C. 102(e) as being anticipated by Takei et al. (EP 1 315 045 A1).

Takei et al. disclose a composition for forming a gap-filling material to be used in a semiconductor device by a method of applying the composition to the substrate with holes having an aspect ratio of at least 1 to planarize the surface of the substrate; then applying a resist coating onto a substrate; and finally transferring an image on the substrate using a lithographic process, wherein the composition comprises a polymer having a weight average molecular weight of 500 to 30,000, a crosslinking agent, and additives (page 3, lines 55-56; [0066]-[0069]; claims 1 and 17). Takei et al. further disclose that the polymer is poly(p-vinylphenol), poly(styrene-co-p-vinylphenol), poly(methyl methacrylate-co-p-vinylphenol), poly(2-hydroxyethyl methacrylate-co-p-vinylphenol), poly(butyl acrylate-co-p-vinylphenol), or novolac type phenol resin (Example 6; claims 11 and 13-16). Thus, the present claims are anticipated by the disclosure of Takei et al.

6. Claims 1-2 and 4-13 are rejected under 35 U.S.C. 102(e) as being anticipated by Meador et al. (US 5,919,599).

Meador et al. disclose a deep ultraviolet antireflective composition comprising (A) the reaction product of an acrylic polymer or copolymer and a deep ultraviolet light absorbing carboxylic acid or phenolic dye to produce a polymer or copolymer linked to the carboxylic acid or phenolic dye via a hydroxyester moiety or a hydroxyether moiety respectively, (B) a crosslinking agent, and (C) an acid catalyst (Fig. 1; claim 1). Thus, the present claims are anticipated by the disclosure of Meador et al.

Response to the Applicants' Arguments

7. Applicant's arguments filed on March 15, 2007 have been fully considered but they are not persuasive.

"EP '045 teaches a gap filling material forming composition containing a hydroxy styrene polymer and a crosslinking agent. The gap filling material is subjected to dry etching by use of a recessed pattern formed by resist coating on the gap filling material. **It is not used in an etching process by an alkaline aqueous solution**, as is positively recited, among other features, in independent claim 1. Further, the coated film in EP '045 has a low solubility in alkaline aqueous solution due to the presence of hydroxy styrene polymer and is therefore not suitable to process such as is positively recited in independent claim 1."

Attention is drawn to claim 8 of the present invention, wherein "[t]he gap fill material forming composition according to claim 1, wherein the polymer is a polymer containing hydroxystyrene as repeating unit." Thus, **a polymer containing**

Art Unit: 1713

hydroxystyrene can be used in an etching process by using an alkaline aqueous solution other than in dry etch process disclosed in EP'045. Referring to the property related to the dissolution rate, all references are silent on such property. However, it is an inherent property. If the composition is substantially identical to the one claimed in the present invention, the films made from these substantially identical compositions would possess the identical property such as dissolution rate in the alkaline aqueous solution.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

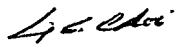
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the

Art Unit: 1713

examiner should be directed to Ling-Siu Choi whose telephone number is 571-272-1098.

If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reach on 571-272-1114.



LING-SUI CHOI
PRIMARY EXAMINER

May 31, 2007